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(54) **MOBILE TERMINAL AND DISPLAY DEVICE FOR SEARCHING FOR LOCATION OF REMOTE CONTROL DEVICE BY USING Bluetooth PAIRING**

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H04W 4/80 (2018.01)

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CPC ***G08B 21/24*** (2013.01); ***H04W 4/80*** (2018.02)

(58) **Field of Classification Search**
CPC G08B 21/24; H04W 4/80
See application file for complete search history.

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(57) **ABSTRACT**

The present disclosure provides a mobile terminal comprising a communication unit that is paired with a display device and configured to perform a communication; an input unit configured to receive a search command from a user; a processor configured to transmit a search function activation command to the display device through the communication unit, receive a packet signal from a remote control device that transmits a packet signal at a predetermined packet period according to the search function activation command of the display device, obtain a signal strength of the packet signal, receive packet pattern information from the display device, and determine a distance with the remote control device based on whether the packet is changed and the signal strength.

12 Claims, 9 Drawing Sheets

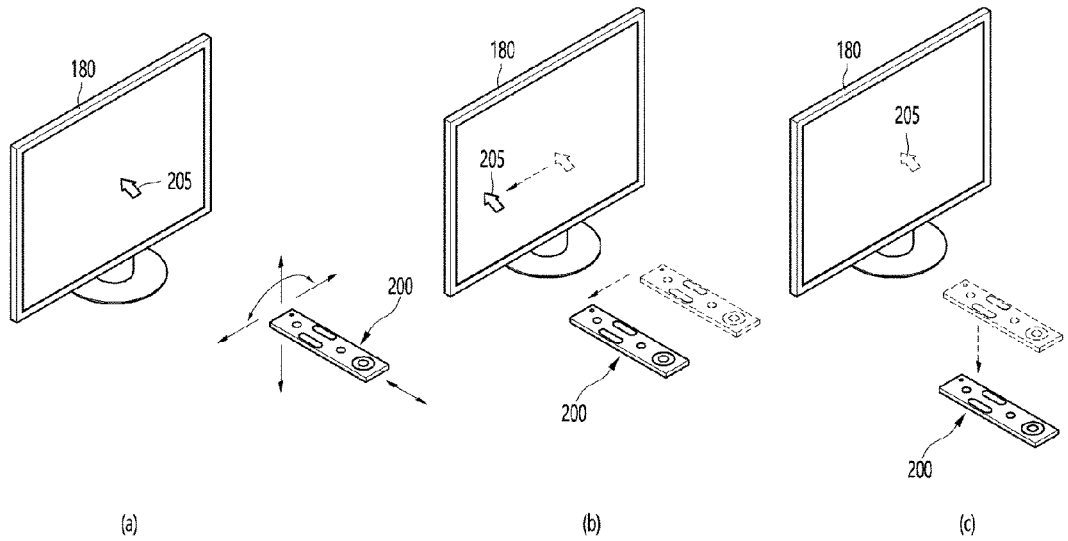

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FIG. 1

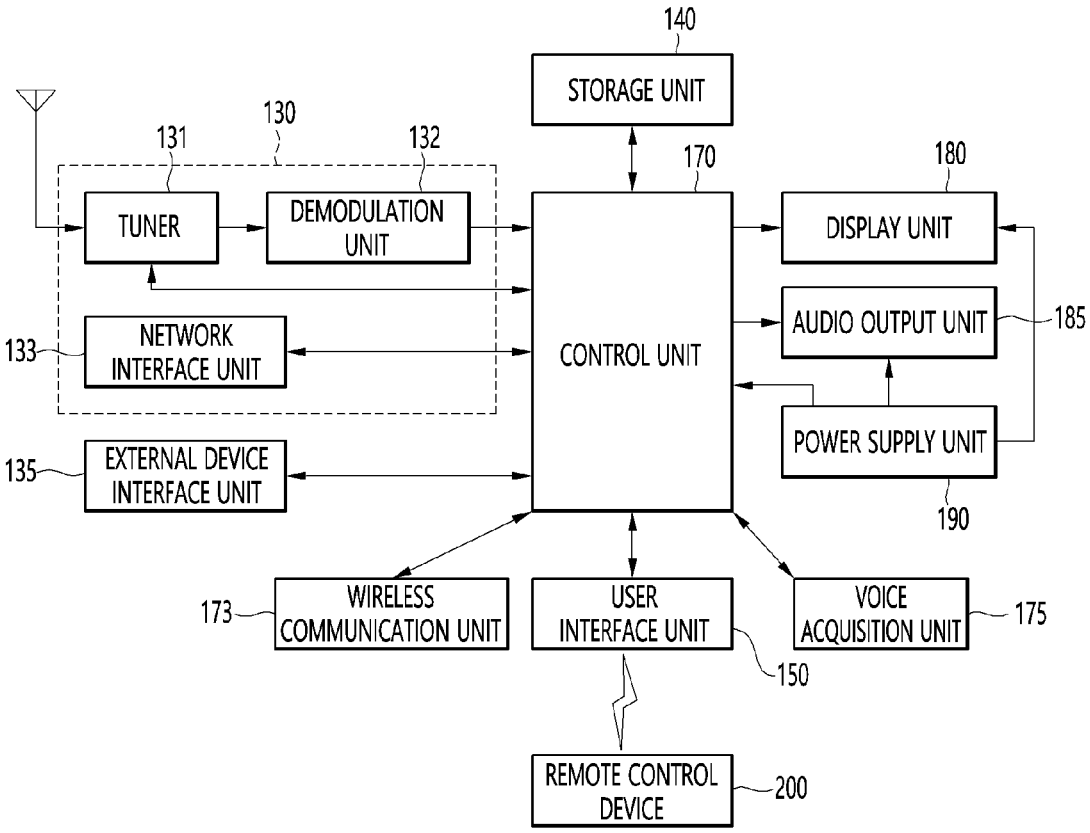

100
140
STORAGE UNIT
130
131
132
170
180
TUNER
DEMODULATION UNIT
DISPLAY UNIT
AUDIO OUTPUT UNIT
185
133
NETWORK INTERFACE UNIT
CONTROL UNIT
POWER SUPPLY UNIT
135
EXTERNAL DEVICE INTERFACE UNIT
190
173
WIRELESS COMMUNICATION UNIT
USER INTERFACE UNIT
VOICE ACQUISITION UNIT
175
150
REMOTE CONTROL DEVICE
200

FIG. 2

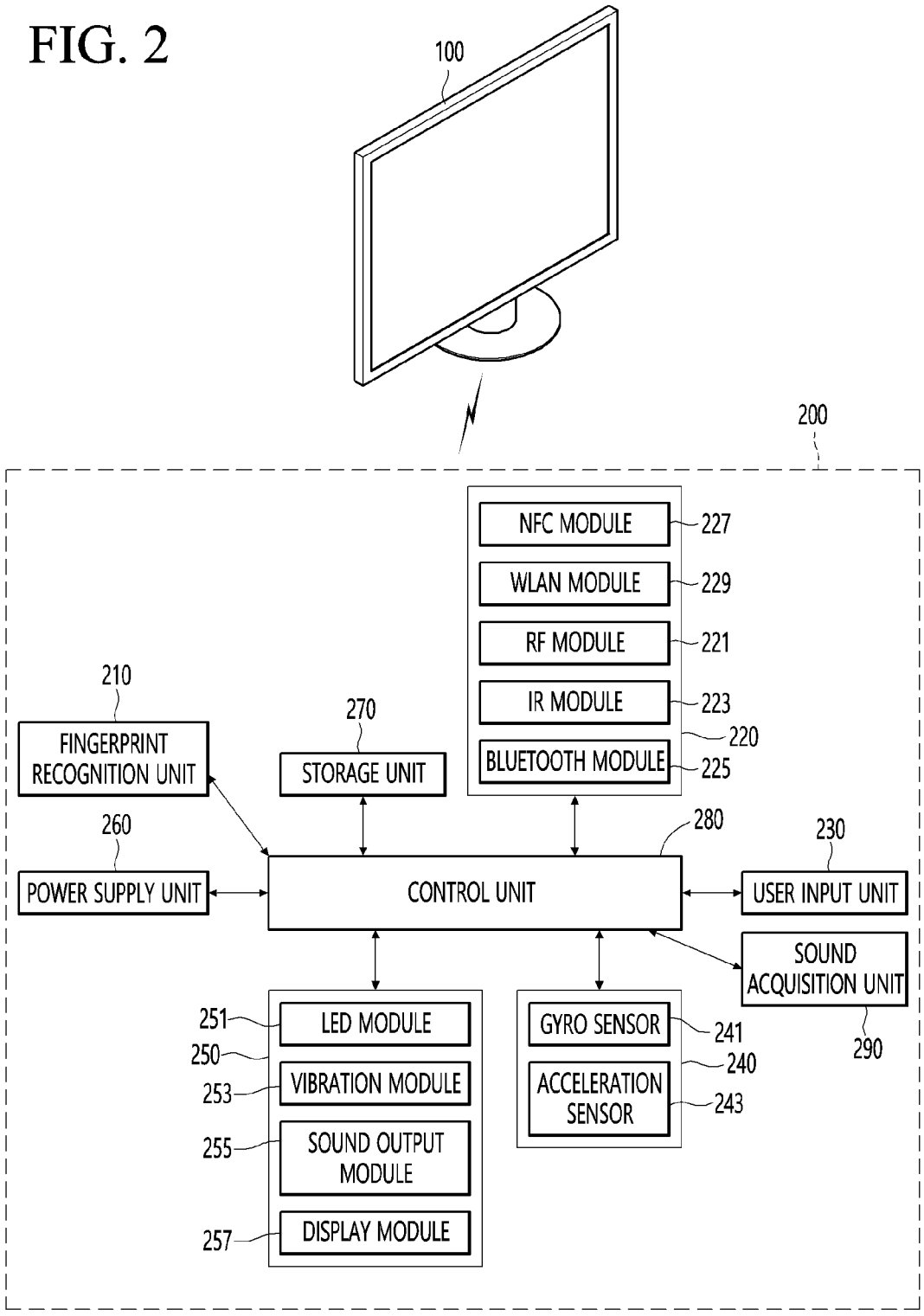

100
200
NFC MODULE
227
WLAN MODULE
229
RF MODULE
221
IR MODULE
223
220
BLUETOOTH MODULE
225
210
FINGERPRINT RECOGNITION UNIT
270
STORAGE UNIT
260
POWER SUPPLY UNIT
280
CONTROL UNIT
230
USER INPUT UNIT
SOUND ACQUISITION UNIT
290
251
LED MODULE
250
VIBRATION MODULE
253
255
SOUND OUTPUT MODULE
257
DISPLAY MODULE
GYRO SENSOR
241
240
ACCELERATION SENSOR
243

FIG. 3

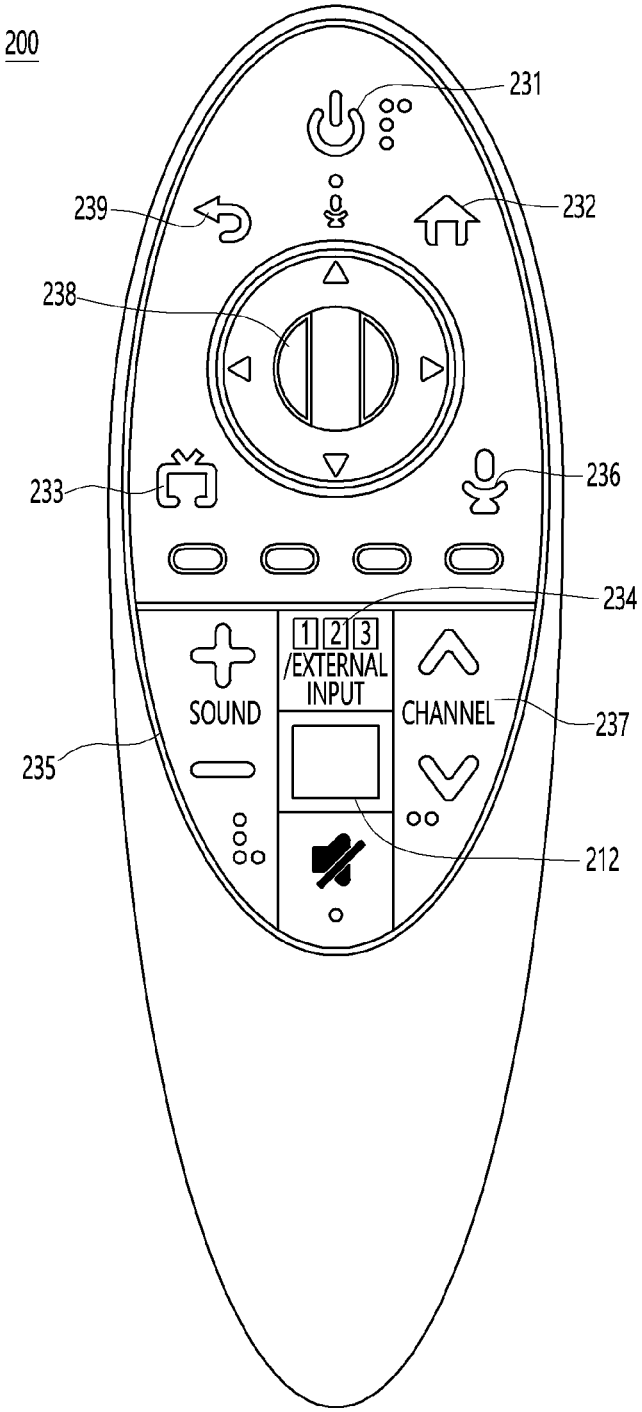

200
231
239
232
238
233
236
234
1 2 3
/EXTERNAL
INPUT
SOUND
CHANNEL
237
235
212

FIG. 4

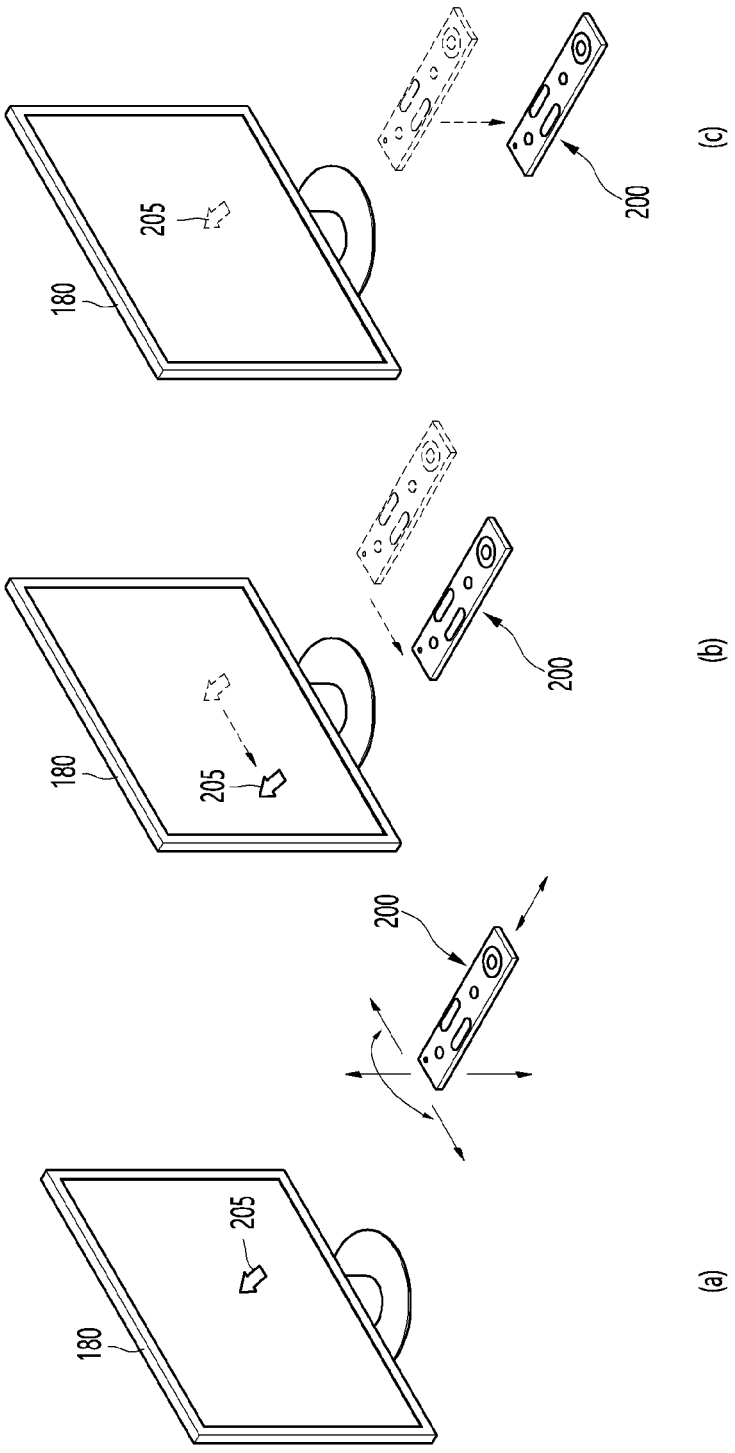


FIG. 5

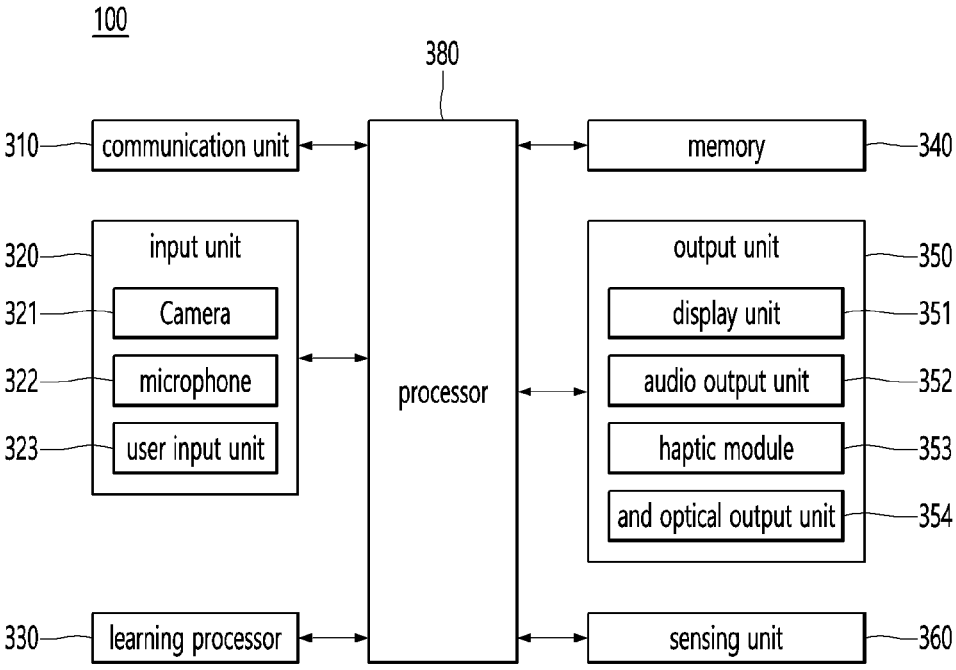

100
380
310
communication unit
memory
340
320
input unit
output unit
350
321
Camera
display unit
351
322
microphone
audio output unit
352
323
user input unit
haptic module
353
processor
and optical output unit
354
330
learning processor
sensing unit
360

FIG. 6

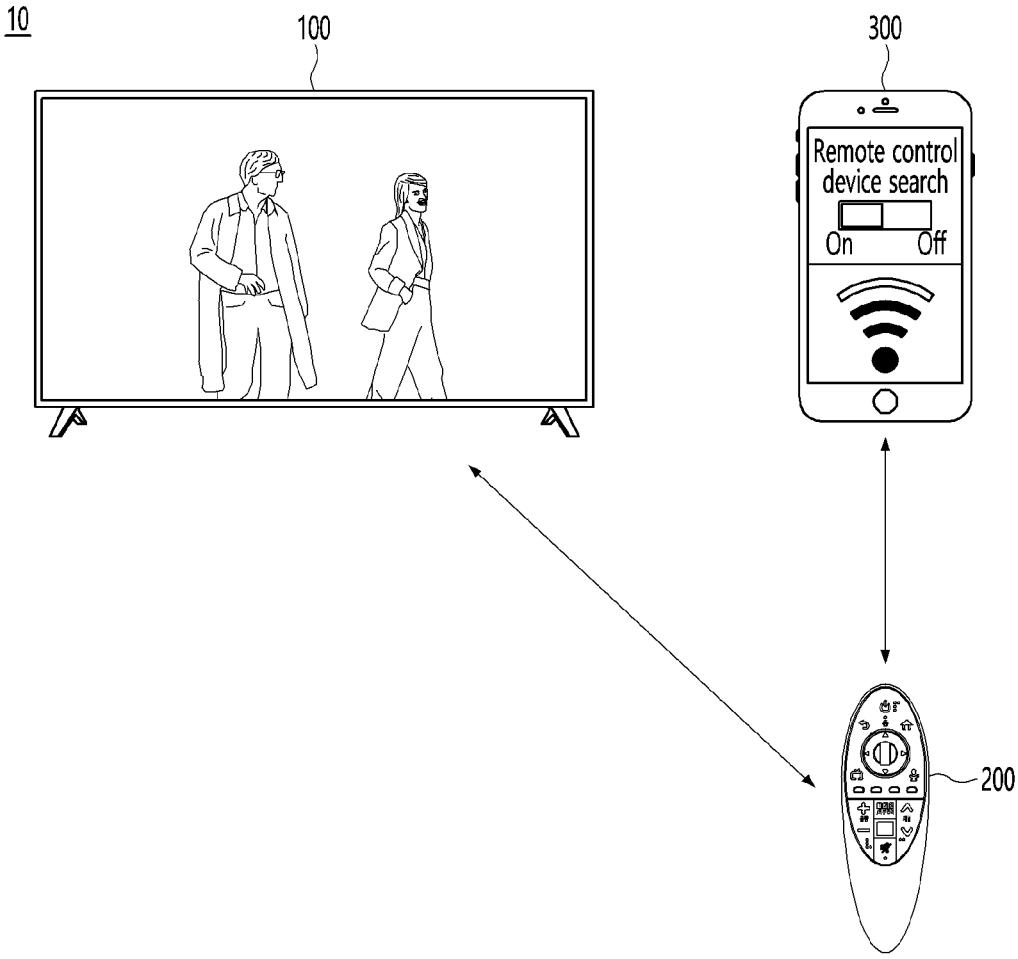


FIG. 7

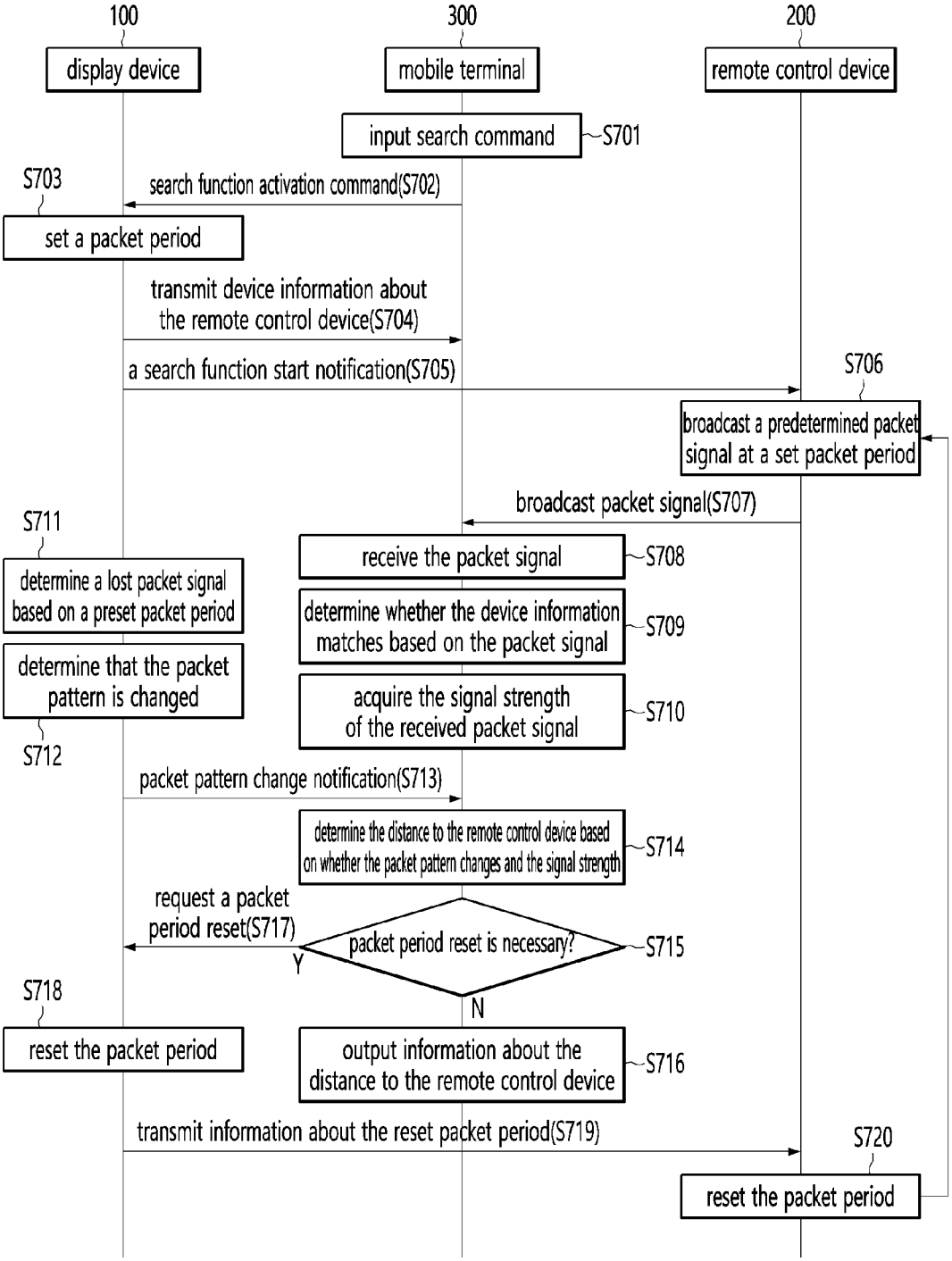

100
display device
300
mobile terminal
200
remote control device
input search command
S701
S703
search function activation command(S702)
set a packet period
transmit device information about the remote control device(S704)
a search function start notification(S705)
S706
broadcast a predetermined packet signal at a set packet period
broadcast packet signal(S707)
S711
receive the packet signal
S708
determine a lost packet signal based on a preset packet period
determine whether the device information matches based on the packet signal
S709
determine that the packet pattern is changed
acquire the signal strength of the received packet signal
S710
S712
packet pattern change notification(S713)
determine the distance to the remote control device based on whether the packet pattern changes and the signal strength
S714
request a packet period reset(S717)
packet period reset is necessary?
S715
Y
N
S718
reset the packet period
output information about the distance to the remote control device
S716
transmit information about the reset packet period(S719)
S720
reset the packet period

FIG. 8

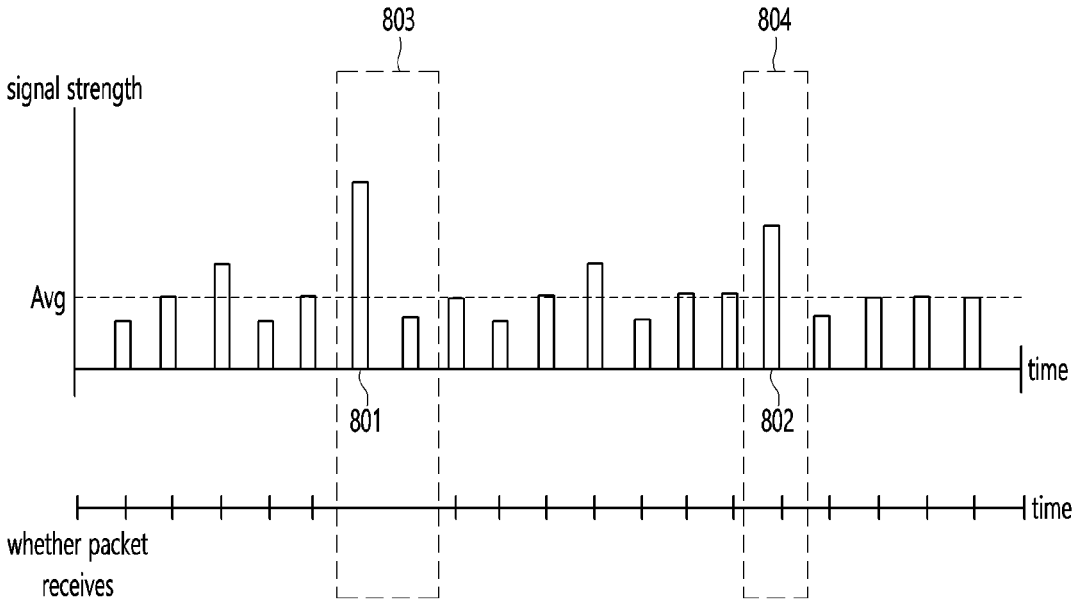
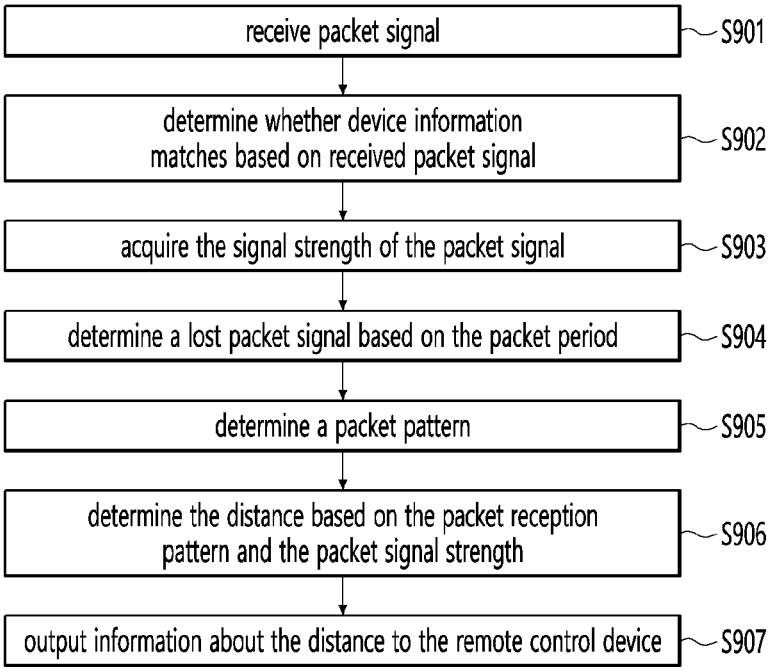

803
804
signal strength
Avg
time
801
802
time
whether packet
receives

FIG. 9


receive packet signal
S901
determine whether device information matches based on received packet signal
S902
acquire the signal strength of the packet signal
S903
determine a lost packet signal based on the packet period
S904
determine a packet pattern
S905
determine the distance based on the packet reception pattern and the packet signal strength
S906
output information about the distance to the remote control device
S907

MOBILE TERMINAL AND DISPLAY DEVICE FOR SEARCHING FOR LOCATION OF REMOTE CONTROL DEVICE BY USING Bluetooth PAIRING

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is the National Stage filing under 35 U.S.C. 371 of International Application No. PCT/KR2020/014540, filed on Oct. 22, 2020, the contents of which are all incorporated by reference herein in their entirety.

TECHNICAL FIELD

The present disclosure relates to a display device for searching for a remote control device and a method for searching for a remote control device, and more particularly, it relates to a display device and a method for searching a remote control device capable of searching the remote control device by determining a distance between a mobile terminal paired with the display device through Bluetooth communication and the remote control device paired with the display device through Bluetooth communication.

BACKGROUND

In general, a user viewing a display device uses a remote control device capable of remotely controlling the display device.

However, the remote control device provides the convenience of easily manipulating the display device from a distance, but since the remote control device is relatively small and operated as an independent unit, and is carried and used by several people, if it does not be placed in a fixed place after use, each user who wanted to use the remote control had to navigate to find it.

Therefore, a countermeasure for easily finding the location of the remote control device has been required, and accordingly, an induction method which a notification sound module is installed in the remote control device so that when a search signal is received by the remote control device and the remote control device emits a notification sound and allows the user to find it has been proposed.

However, this conventional technology has a problem in that the amount of money for the module is added from the production/sales point of view because hardware generating a notification sound must be added to the remote control device.

In addition, since the location of the remote control device is simply notified to the user with an alarm sound, there was a problem that the exact location of the remote control device could not be determined, so the user cannot accurately recognize the alarm sound when the remote control device is located in a place where the sound is hard to hear or when there is noise in the surroundings.

DISCLOSURE

Technical Problem

The problem to be solved by the present disclosure is to provide a display device and a method for searching a remote control device capable of searching for a location of a remote control device paired with a display device using a mobile terminal paired with the display device.

The problem to be solved by the present disclosure is to provide a search method capable of searching for the location of a remote control device with a mobile terminal using Bluetooth communication without adding hardware such as a separate notification sound module to the remote control device.

Technical Solution

A mobile terminal according to an embodiment of the present disclosure, comprising a communication unit that is paired with a display device and configured to perform a communication; an input unit configured to receive a search command from a user; a processor configured to transmit a search function activation command to the display device through the communication unit, receive a packet signal from a remote control device that transmits a packet signal at a predetermined packet period according to the search function activation command of the display device, obtain a signal strength of the packet signal, receive packet pattern information from the display device, and determine a distance with the remote control device based on whether the packet is changed and the signal strength.

A display device according to an embodiment of the present disclosure, wherein the display device is paired with a mobile terminal and a remote control device and the display device comprises a communication unit configured to receive a search function activation command from the mobile terminal; a processor configured to: in response to the search function activation command, transmit device information on the remote control device to the mobile terminal through the communication unit, set a packet period so that the remote control device broadcasts a predetermined packet at a predetermined packet period, and transmit the set packet period with a search function start notification to the remote control device through the communication unit.

Advantageous Effects

According to an embodiment of the present disclosure, the display device may use a mobile terminal paired with the display device to search for a location of the remote control device paired with the display device.

According to an embodiment of the present disclosure, the location of the remote control device can be searched by using Bluetooth communication between the display device, the mobile terminal, and the remote control device without adding hardware such as a separate notification sound module to the remote control device.

DESCRIPTION OF DRAWINGS

FIG. **1** is a block diagram illustrating a configuration of a display device according to an embodiment of the present disclosure.

FIG. **2** is a block diagram of a remote control device according to an embodiment of the present disclosure.

FIG. **3** shows an example of an actual configuration of a remote control device according to an embodiment of the present disclosure.

FIG. **4** shows an example of using a remote control device according to an embodiment of the present disclosure.

FIG. **5** is a block diagram of a mobile terminal according to an embodiment of the present disclosure.

FIG. **6** illustrates a remote control device search system according to an embodiment of the present disclosure.

FIG. **7** is a flowchart illustrating a method for searching for a remote control device according to an embodiment of the present disclosure.

FIG. **8** is a diagram for illustrating a method of determining a distance with a remote control device according to an embodiment of the present disclosure.

FIG. **9** is a flowchart illustrating a method for searching for a remote control device according to an embodiment of the present disclosure.

BEST MODE

Hereinafter, embodiments relating to the present disclosure will be described in detail with reference to the drawings. The suffixes "module" and "unit" for components used in the description below are assigned or mixed in consideration of easiness in writing the specification and do not have distinctive meanings or roles by themselves.

FIG. **1** is a block diagram illustrating a configuration of a display device according to an embodiment of the present disclosure.

Referring to FIG. **1**, a display device **100** can include a broadcast reception unit **130**, an external device interface unit **135**, a storage unit **140**, a user input interface unit **150**, a control unit **170**, a wireless communication interface unit **173**, a voice acquisition unit **175**, a display unit **180**, an audio output interface unit **185**, and a power supply unit **190**.

The broadcast reception unit **130** can include a tuner **131**, a demodulation unit **132**, and a network interface unit **133**.

The tuner **131** can select a specific broadcast channel according to a channel selection command. The tuner **131** can receive broadcast signals for the selected specific broadcast channel.

The demodulation unit **132** can divide the received broadcast signals into video signals, audio signals, and broadcast program related data signals and restore the divided video signals, audio signals, and data signals to an output available form.

The network interface unit **133** can provide an interface for connecting the display device **100** to a wired/wireless network including internet network. The network interface unit **133** can transmit or receive data to or from another user or another electronic device through an accessed network or another network linked to the accessed network.

The network interface unit **133** can access a predetermined webpage through an accessed network or another network linked to the accessed network. That is, it can transmit or receive data to or from a corresponding server by accessing a predetermined webpage through network.

Then, the network interface unit **133** can receive contents or data provided from a content provider or a network operator. That is, the network interface unit **133** can receive contents such as movies, advertisements, games, VODs, and broadcast signals, which are provided from a content provider or a network provider, through network and information relating thereto.

Additionally, the network interface unit **133** can receive firmware update information and update files provided from a network operator and transmit data to an internet or content provider or a network operator.

The network interface unit **133** can select and receive a desired application among applications open to the air, through network.

The external device interface unit **135** can receive an application or an application list in an adjacent external device and deliver it to the control unit **170** or the storage unit **140**.

The external device interface unit **135** can provide a connection path between the display device **100** and an external device. The external device interface unit **135** can receive at least one of image and audio outputted from an external device that is wirelessly or wiredly connected to the display device **100** and deliver it to the controller. The external device interface unit **135** can include a plurality of external input terminals. The plurality of external input terminals can include an RGB terminal, at least one High Definition Multimedia Interface (HDMI) terminal, and a component terminal.

An image signal of an external device inputted through the external device interface unit **135** can be outputted through the display unit **180**. A sound signal of an external device inputted through the external device interface unit **135** can be outputted through the audio output interface unit **185**.

An external device connectable to the external device interface unit **135** can be one of a set-top box, a Blu-ray player, a DVD player, a game console, a sound bar, a smartphone, a PC, a USB Memory, and a home theater system but this is just exemplary.

Additionally, some content data stored in the display device **100** can be transmitted to a user or an electronic device, which is selected from other users or other electronic devices pre-registered in the display device **100**.

The storage unit **140** can store signal-processed image, voice, or data signals stored by a program in order for each signal processing and control in the control unit **170**.

Additionally, the storage unit **140** can perform a function for temporarily store image, voice, or data signals outputted from the external device interface unit **135** or the network interface unit **133** and can store information on a predetermined image through a channel memory function.

The storage unit **140** can store an application or an application list inputted from the external device interface unit **135** or the network interface unit **133**.

The display device **100** can play content files (for example, video files, still image files, music files, document files, application files, and so on) stored in the storage unit **140** and provide them to a user.

The user input interface unit **150** can deliver signals inputted from a user to the control unit **170** or deliver signals from the control unit **170** to a user. For example, the user input interface unit **150** can receive or process control signals such as power on/off, channel selection, and screen setting from the remote control device **200** or transmit control signals from the control unit **170** to the remote control device **200** according to various communication methods such as Bluetooth, Ultra Wideband (WB), ZigBee, Radio Frequency (RF), and IR.

Additionally, the user input interface unit **150** can deliver, to the control unit **170**, control signals inputted from local keys (not shown) such as a power key, a channel key, a volume key, and a setting key.

Image signals that are image-processed in the control unit **170** can be inputted to the display unit **180** and displayed as an image corresponding to corresponding image signals. Additionally, image signals that are image-processed in the control unit **170** can be inputted to an external output device through the external device interface unit **135**.

Voice signals processed in the control unit **170** can be outputted to the audio output interface unit **185**. Additionally, voice signals processed in the control unit **170** can be inputted to an external output device through the external device interface unit **135**.

Besides that, the control unit **170** can control overall operations in the display device **100**.

Additionally, the control unit **170** can control the display device **100** by a user command or internal program inputted through the user input interface unit **150** and download a desired application or application list into the display device **100** in access to network.

The control unit **170** can output channel information selected by a user together with processed image or voice signals through the display unit **180** or the audio output interface unit **185**.

Additionally, according to an external device image playback command received through the user input interface unit **150**, the control unit **170** can output image signals or voice signals of an external device such as a camera or a camcorder, which are inputted through the external device interface unit **135**, through the display unit **180** or the audio output interface unit **185**.

Moreover, the control unit **170** can control the display unit **180** to display images and control broadcast images inputted through the tuner **131**, external input images inputted through the external device interface unit **135**, images inputted through the network interface, or images stored in the storage unit **140** to be displayed on the display unit **180**. In this case, an image displayed on the display unit **180** can be a still image or video and also can be a 2D image or a 3D image.

Additionally, the control unit **170** can play content stored in the display device **100**, received broadcast content, and external input content inputted from the outside, and the content can be in various formats such as broadcast images, external input images, audio files, still images, accessed web screens, and document files.

Moreover, the wireless communication interface unit **173** can perform a wired or wireless communication with an external electronic device. The wireless communication interface unit **173** can perform short-range communication with an external device. For this, the wireless communication interface unit **173** can support short-range communication by using at least one of Bluetooth™, Radio Frequency Identification (RFID), Infrared Data Association (IrDA), Ultra Wideband (UWB), ZigBee, Near Field Communication (NFC), Wireless-Fidelity (Wi-Fi), Wi-Fi Direct, and Wireless Universal Serial Bus (USB) technologies. The wireless communication interface unit **173** can support wireless communication between the display device **100** and a wireless communication system, between the display device **100** and another display device **100**, or between networks including the display device **100** and another display device **100** (or an external server) through wireless area networks. The wireless area networks can be wireless personal area networks.

Herein, the other display device **100** can be a mobile terminal such as a wearable device (for example, a smart watch, a smart glass, and a head mounted display (HMD)) or a smartphone, which is capable of exchanging data (or inter-working) with the display device **100**. The wireless communication interface unit **173** can detect (or recognize) a communicable wearable device around the display device **100**. Furthermore, if the detected wearable device is a device authenticated to communicate with the display device **100**, the control unit **170** can transmit at least part of data processed in the display device **100** to the wearable device through the wireless communication interface unit **173**. Accordingly, a user of the wearable device can use the data processed in the display device **100** through the wearable device.

The voice acquisition unit **175** can acquire audio. The voice acquisition unit **175** may include at least one microphone (not shown), and can acquire audio around the display device **100** through the microphone (not shown).

The display unit **180** can convert image signals, data signals, or OSD signals, which are processed in the control unit **170**, or images signals or data signals, which are received in the external device interface unit **135**, into R, G, and B signals to generate driving signals.

Furthermore, the display device **100** shown in FIG. **1** is just one embodiment of the present disclosure and thus, some of the components shown can be integrated, added, or omitted according to the specification of the actually implemented display device **100**.

That is, if necessary, two or more components can be integrated into one component or one component can be divided into two or more components and configured. Additionally, a function performed by each block is to describe an embodiment of the present disclosure and its specific operation or device does not limit the scope of the present disclosure.

According to another embodiment of the present disclosure, unlike FIG. **1**, the display device **100** can receive images through the network interface unit **133** or the external device interface unit **135** and play them without including the tuner **131** and the demodulation unit **132**.

For example, the display device **100** can be divided into an image processing device such as a set-top box for receiving broadcast signals or contents according to various network services and a content playback device for playing contents inputted from the image processing device.

In this case, an operating method of a display device according to an embodiment of the present disclosure described below can be performed by one of the display device described with reference to FIG. **1**, an image processing device such as the separated set-top box, and a content playback device including the display unit **180** and the audio output interface unit **185**.

The audio output interface unit **185** receives the audio processed signal from the control unit **170** and outputs the sound.

The power supply unit **190** supplies the corresponding power throughout the display device **100**. In particular, the power supply unit **190** supplies power to the control unit **170** that can be implemented in the form of a System On Chip (SOC), a display unit **180** for displaying an image, and the audio output interface unit **185** for outputting audio or the like.

Specifically, the power supply unit **190** may include a converter for converting an AC power source into a DC power source, and a DC/DC converter for converting a level of the DC source power.

Then, referring to FIGS. **2** and **3**, a remote control device is described according to an embodiment of the present disclosure.

FIG. **2** is a block diagram illustrating a remote control device according to an embodiment of the present disclosure and FIG. **3** is a view illustrating an actual configuration of a remote control device according to an embodiment of the present disclosure.

First, referring to FIG. **2**, a remote control device **200** can include a fingerprint recognition module **210**, a wireless communication interface **220**, a user input interface **230**, a sensor **240**, an output interface **250**, a power supply **260**, a storage **270**, a controller **280**, and a voice acquisition module **290**.

Referring to FIG. **2**, the wireless communication interface **220** transmits/receives signals to/from an arbitrary any one of display devices according to the above-mentioned embodiments of the present disclosure.

The remote control device **200** can include an RF module **221** for transmitting/receiving signals to/from the display device **100** according to the RF communication standards and an IR module **223** for transmitting/receiving signals to/from the display device **100** according to the IR communication standards. Additionally, the remote control device **200** can include a Bluetooth module **225** for transmitting/receiving signals to/from the display device **100** according to the Bluetooth communication standards. Additionally, the remote control device **200** can include an NFC module **227** for transmitting/receiving signals to/from the display device **100** according to the Near Field Communication (NFC) communication standards and a WLAN module **229** for transmitting/receiving signals to/from the display device **100** according to the Wireless LAN (WLAN) communication standards

Additionally, the remote control device **200** can transmit signals containing information on a movement of the remote control device **200** to the display device **100** through the wireless communication interface **220**.

Moreover, the remote control device **200** can receive signals transmitted from the display device **100** through the RF module **221** and if necessary, can transmit a command on power on/off, channel change, and volume change to the display device **100** through the IR module **223**.

The user input interface **230** can be configured with a keypad button, a touch pad, or a touch screen. A user can manipulate the user input interface **230** to input a command relating to the display device **100** to the remote control device **200**. If the user input interface **230** includes a hard key button, a user can input a command relating to the display device **100** to the remote control device **200** through the push operation of the hard key button. This will be described with reference to FIG. **3**.

Referring to FIG. **3**, the remote control device **200** can include a plurality of buttons. The plurality of buttons can include a fingerprint recognition button **212**, a power button **231**, a home button **232**, a live button **233**, an external input button **234**, a voice adjustment button **235**, a voice recognition button **236**, a channel change button **237**, a check button **238**, and a back button **239**.

The fingerprint recognition button **212** can be a button for recognizing a user's fingerprint. According to an embodiment of the present disclosure, the fingerprint recognition button **212** can perform a push operation and receive a push operation and a fingerprint recognition operation. The power button **231** can be button for turning on/off the power of the display device **100**. The power button **231** can be button for moving to the home screen of the display device **100**. The live button **233** can be a button for displaying live broadcast programs. The external input button **234** can be button for receiving an external input connected to the display device **100**. The voice adjustment button **235** can be button for adjusting the size of a volume outputted from the display device **100**. The voice recognition button **236** can be a button for receiving user's voice and recognizing the received voice. The channel change button **237** can be a button for receiving broadcast signals of a specific broadcast channel. The check button **238** can be a button for selecting a specific function and the back button **239** can be a button for returning to a previous screen.

Again, FIG. **2** is described.

If the user input interface **230** includes a touch screen, a user can touch a soft key of the touch screen to input a command relating to the display device **100** to the remote control device **200**. Additionally, the user input interface **230** can include various kinds of input means manipulated by a user, for example, a scroll key and a jog key, and this embodiment does not limit the scope of the present disclosure.

The sensor **240** can include a gyro sensor **241** or an acceleration sensor **243** and the gyro sensor **241** can sense information on a movement of the remote control device **200**.

For example, the gyro sensor **241** can sense information on an operation of the remote control device **200** on the basis of x, y, and z axes and the acceleration sensor **243** can sense information on a movement speed of the remote control device **200**. Moreover, the remote control device **200** can further include a distance measurement sensor and sense a distance with respect to the display unit **180** of the display device **100**.

The output interface **250** can output image or voice signals corresponding to a manipulation of the user input interface **230** or corresponding to signals transmitted from the display device **100**. A user can recognize whether the user input interface **230** is manipulated or the display device **100** is controlled through the output interface **250**.

For example, the output interface **250** can include an LED module **251** for flashing, a vibration module **253** for generating vibration, a sound output module **255** for outputting sound, or a display module **257** for outputting an image, if the user input interface **230** is manipulated or signals are transmitted/received to/from the display device **100** through the wireless communication interface **220**.

Additionally, the power supply **260** supplies power to the remote control device **200** and if the remote control device **200** does not move for a predetermined time, stops the power supply, so that power waste can be reduced. The power supply **260** can resume the power supply if a predetermined key provided at the remote control device **200** is manipulated.

The storage **270** can store various kinds of programs and application data necessary for a control or operation of the remote control device **200**. If the remote control device **200** transmits/receives signals wirelessly through the display device **100** and the RF module **221**, the remote control device **200** and the display device **100** transmits/receives signals through a predetermined frequency band.

The controller **280** of the remote control device **200** can store, in the storage **270**, information on a frequency band for transmitting/receiving signals to/from the display device **100** paired with the remote control device **200** and refer to it.

The controller **280** controls general matters relating to a control of the remote control device **200**. The controller **280** can transmit a signal corresponding to a predetermined key manipulation of the user input interface **230** or a signal corresponding to a movement of the remote control device **200** sensed by the sensor **240** to the display device **100** through the wireless communication interface **220**.

Additionally, the voice acquisition module **290** of the remote control device **200** can obtain voice.

The voice acquisition module **290** can include at least one microphone **291** and obtain voice through the microphone **291**.

Then, FIG. **4** is described.

FIG. **4** is a view of utilizing a remote control device according to an embodiment of the present disclosure.

FIG. **4**A illustrates that a pointer **205** corresponding to the remote control device **200** is displayed on the display unit **180**.

A user can move or rotate the remote control device **200** vertically or horizontally. The pointer **205** displayed on the display unit **180** of the display device **100** corresponds to a movement of the remote control device **200**. Since the corresponding pointer **205** is moved and displayed according to a movement on a 3D space as show in the drawing, the remote control device **200** can be referred to as a spatial remote controller.

FIG. **4**B illustrates that if a user moves the remote control device **200**, the pointer **205** displayed on the display unit **180** of the display device **100** is moved to the left in correspondence thereto.

Information on a movement of the remote control device **200** detected through a sensor of the remote control device **200** is transmitted to the display device **100**. The display device **100** can calculate the coordinates of the pointer **205** from the information on the movement of the remote control device **200**. The display device **100** can display the pointer **205** to match the calculated coordinates.

FIG. **4**C illustrates that while a specific button in the remote control device **200** is pressed, a user moves the remote control device **200** away from the display unit **180**. Thus, a selection area in the display unit **180** corresponding to the pointer **205** can be zoomed in and displayed largely.

On the other hand, if a user moves the remote control device **200** close to the display unit **180**, a selection area in the display unit **180** corresponding to the pointer **205** can be zoomed out and displayed reduced.

On the other hand, if the remote control device **200** is away from the display unit **180**, a selection area can be zoomed out and if the remote control device **200** is close to the display unit **180**, a selection area can be zoomed in.

Additionally, if a specific button in the remote control device **200** is pressed, the recognition of a vertical or horizontal movement can be excluded. That is, if the remote control device **200** is moved away from or close to the display unit **180**, the up, down, left, or right movement can not be recognized and only the back and fourth movement can be recognized. While a specific button in the remote control device **200** is not pressed, only the pointer **205** is moved according to the up, down, left or right movement of the remote control device **200**.

Moreover, the moving speed or moving direction of the pointer **205** can correspond to the moving speed or moving direction of the remote control device **200**.

Furthermore, a pointer in this specification means an object displayed on the display unit **180** in correspondence to an operation of the remote control device **200**. Accordingly, besides an arrow form displayed as the pointer **205** in the drawing, various forms of objects are possible. For example, the above concept includes a point, a cursor, a prompt, and a thick outline. Then, the pointer **205** can be displayed in correspondence to one point of a horizontal axis and a vertical axis on the display unit **180** and also can be displayed in correspondence to a plurality of points such as a line and a surface.

Meanwhile, the control unit **170** may also be referred to as a processor **170**. Also, the storage unit **140** may be referred to as a memory **140**. Also, the wireless communication unit **173** may be referred to as a communication interface **173**.

FIG. **5** is a block diagram of a mobile terminal according to an embodiment of the present disclosure.

The mobile terminal **300** may be implemented as a mobile device such as a mobile phone, a smart phone, a laptop computer, a digital broadcasting terminal, a personal digital assistant (PDA), a portable multimedia player (PMP), a navigation device, a tablet PC, and a wearable device.

Referring to FIG. **1**, a mobile terminal **300** may include a communication unit **310**, an input unit **320**, a learning processor **330**, a sensing unit **340**, an output unit **350**, a memory **370**, a processor **380**, and the like.

The communication unit **310** may transmit/receive data with external devices such as other devices **100** to **200** using wired/wireless communication technology. For example, the communication unit **310** may transmit/receive sensor information, a user input, a learning model, a control signal, and the like with external devices.

At this time, the communication technology used by the communication unit **310** includes Global System for Mobile communication (GSM), Code Division Multi Access (CDMA), Long Term Evolution (LTE), 5G, Wireless LAN (WLAN), and Wireless-Fidelity (Wi-Fi), Bluetooth, Radio Frequency Identification (RFID), Infrared Data Association (IrDA), ZigBee, and Near Field Communication (NFC). In addition, the communication technology used by the communication unit **310** may include Bluetooth Low Energy (BLE).

The input unit **320** may acquire various types of data.

The input unit **320** may include a camera (Camera, **321**) for inputting a video signal, a microphone (Microphone, **322**) for receiving an audio signal, and a user input unit (User Input Unit, **323**) for receiving information from a user.

Audio data or image data collected by the input unit **320** may be analyzed and processed as a user's control command.

The input unit **320** is for inputting video information (or signal), audio information (or signal), data, or information input from a user and for inputting video information, the mobile terminal **300** may include one or a plurality of cameras **321**.

The camera **321** processes an image frame such as a still image or a moving image obtained by an image sensor in a video call mode or a photographing mode. The processed image frame may be displayed on the display unit **351** or stored in the memory **370**.

The microphone **322** processes external sound signal into electrical audio data. The processed audio data may be utilized in various ways according to the function (or application program being executed) being performed in the mobile terminal **300**. Meanwhile, various noise cancellation algorithms may be applied to the microphone **322** to remove noise generated in the process of receiving an external sound signal.

The user input unit **323** is for receiving information from a user and if information is input through the user input unit **323**, the processor **380** can control the operation of the mobile terminal **300** to correspond to the input information.

The user input unit **323** is a mechanical input means (or a mechanical key, for example, a button located on the front/rear side or side of the mobile terminal **300**, a dome switch, a jog wheel, a jog switch, etc.) and a touch input means. As an example, the touch input means may be consist of a virtual key, soft key, or visual key displayed on a touch

screen through software processing, or may be consist of a touch key (touch key) disposed on a part other than the touch screen.

The input unit **320** may obtain learning data for model learning and input data to be used when obtaining an output using the learning model. The input unit **320** may obtain raw input data, and in this case, the processor **380** or the learning processor **330** may extract input features by preprocessing the input data.

The learning processor **330** may train a model composed of an artificial neural network using training data. Here, the learned artificial neural network may be referred to as a learning model. The learning model may be used to infer a result value for new input data other than learning data, and the inferred value may be used as a basis for a decision to perform a certain operation.

In this case, the learning processor **330** may include a memory integrated or implemented in the mobile terminal **300**. Alternatively, the learning processor **330** may be implemented using the memory **370**, an external memory directly coupled to the mobile terminal **300**, or a memory maintained in an external device.

The sensing unit **340** may obtain at least one of internal information of the mobile terminal **300**, surrounding environment information of the mobile terminal **300**, and user information by using various sensors.

At this time, the sensors included in the sensing unit **340** include a proximity sensor, an illuminance sensor, an acceleration sensor, a magnetic sensor, a gyro sensor, an inertial sensor, an RGB sensor, an IR sensor, a fingerprint recognition sensor, an ultrasonic sensor, an optical sensor, a microphone, and a LiDAR sensor, radar, etc.

The output unit **350** may generate an output related to sight, hearing, or touch.

The output unit **350** may include at least one of a display unit **351**, an audio output unit **352**, a haptic module **353**, and an optical output unit **354**.

The display unit **351** displays (outputs) information processed by the mobile terminal **300**. For example, the display unit **351** may display execution screen information of an application program driven in the mobile terminal **300** or UI (User Interface) and GUI (Graphic User Interface) information according to such execution screen information.

The display unit **351** may implement a touch screen by forming a mutual layer structure or integrally with the touch sensor. Such a touch screen may function as a user input unit **323** providing an input interface between the mobile terminal **300** and the user and provide an output interface between the mobile terminal **300** and the user.

The audio output unit **352** may output audio data received from the communication unit **310** or stored in the memory **370** in reception of a call signal, communication mode or recording mode, voice recognition mode, or broadcast reception mode.

The audio output unit **352** may include at least one of a receiver, a speaker, and a buzzer.

A haptic module **353** generates various tactile effects that a user can feel. A representative example of the tactile effect generated by the haptic module **353** may be vibration.

The optical output unit **354** outputs a signal for notifying occurrence of an event using light from a light source of the mobile terminal **300**. Examples of events occurring in the mobile terminal **300** may include message reception, call signal reception, missed calls, alarms, schedule notifications, e-mail reception, and information reception through applications.

The memory **370** may store data supporting various functions of the mobile terminal **300**. For example, the memory **370** may store input data obtained from the input unit **120**, learning data, a learning model, a learning history, and the like.

The processor **380** may determine at least one executable operation of the mobile terminal **300** based on information determined or generated using a data analysis algorithm or a machine learning algorithm. And, the processor **380** may perform the determined operation by controlling components of the mobile terminal **300**.

To this end, the processor **380** may request, search, receive, or utilize data from the learning processor **330** or the memory **370**, and control elements of the mobile terminal **300** to execute a predicted operation or an operation determined to be desirable among the at least one executable operation.

In this case, the processor **380** may generate a control signal for controlling the external device and transmit the generated control signal to the external device when the connection of the external device is required to perform the determined operation.

The processor **380** may obtain intention information for a user input and determine a user's requirement based on the obtained intention information.

At this time, the processor **380** may obtain the user intent information corresponding to the input using at least one of a STT (Speech To Text) engine for converting a voice input into a character string and a Natural Language Processing (NLP) engine for obtaining intention information of a natural language.

At this time, at least one or more of the STT engine or NLP engine may be composed of an artificial neural network at least partially trained according to a machine learning algorithm. And, at least one of the STT engine and the NLP engine may be learned by the learning processor **330**.

The processor **380** may collect and store history information including user's feedback on the contents of operation of the mobile terminal **300** or the operation, and the like, and store it in the memory **370** or the learning processor **330**.

The processor **380** may control at least some of the components of the mobile terminal **300** in order to drive an application program stored in the memory **370**. Furthermore, the processor **380** may combine and operate two or more of the components included in the mobile terminal **300** to drive the application program.

FIG. **6** illustrates a remote control device search system according to an embodiment of the present disclosure.

As shown in FIG. **6**, the remote control device search system **10** may include a display device **100**, a remote control device **200** and a mobile terminal **300**.

The display device **100**, the remote control device **200**, and the mobile terminal **300** may perform short-range communication with each other using respective Bluetooth communication module. For example, the display device **100** may be paired with the remote control device **200** through Bluetooth low energy communication. Also, the display device **100** may be paired with the mobile terminal **300** through Bluetooth low energy communication. Also, the display device **100** may detect the strength of a communication signal transmitted from the remote control device **200** and receive packets transmitted from the remote control device **200**. Also, the mobile terminal **300** can detect the strength of a communication signal transmitted from the remote control device **200** and receive packets transmitted from the remote control device **200**.

On the other hand, Bluetooth Low Energy (hereinafter referred to as 'BLE')" is one of the short-range communication technologies and may mean a core function of Bluetooth V 4.0. Compared to the classic Bluetooth specification, BLE has a relatively small duty cycle, enables low-cost production, and reduces average power and standby power, allowing it to operate for years on a coin-sized battery.

FIG. **7** is a flowchart illustrating a method for searching for a remote control device according to an embodiment of the present disclosure.

The mobile terminal **300** may receive a search command from the user through the input unit **320** (S**701**).

The search command may be a command that activates a function to search for the remote control device **200** that can be performed by the display device **100** and the mobile terminal **300**.

If the mobile terminal **300** receives a search command from the user, the mobile terminal **300** may transmit a search function activation command to the display device **100** through the communication unit **310** (S**702**). In this case, the display device **100** and the mobile terminal **300** may be in a paired state to enable BLE communication.

Meanwhile, the remote control device **200** may transmit packet at predetermined packet period when transmitting packet of manipulation command to the display device **100**. For example, when the remote control device **200** is in a mouse operation mode, a mouse cursor is displayed on the screen of the display device **100**, and a packet related to the movement of the mouse may be transmitted to the display device **100** at a packet period of 10 ms. In addition, when the remote control device **200** is in a non-operating state, for example, when the remote control device **200** is not operated by a user and is lifted from the floor, it may not transmit packet to the display device **100**. Therefore, when a search function for searching the location of the remote control device **200** is activated, it is necessary to set a packet period so that the remote control device **200** can broadcast a predetermined packet at a predetermined packet period.

Accordingly, the display device **100** may set a packet period so that the remote control device **200** can broadcast a predetermined packet at a predetermined packet period (S**703**).

For example, the display device **100** may set a packet period so that the remote control device **200** broadcasts packet at a period of 10 ms.

Also, the display device **100** may transmit device information about the remote control device **200** to the mobile terminal **300** (S**704**).

For example, the device information may include a MAC address (Media Access Control Address) of the remote control device **200** as device identification information. The MAC address may be a unique identifier assigned to a network interface for communication in a data link layer of a network segment. The mobile terminal **300** may receive a signal transmitted by the remote control device **200** based on the MAC address of the remote control device **200** received from the display device **100**.

Also, the device information may include a Received Signal Strength Indicator (RSSI) value of the remote control device **200**. For example, when the display device **100** is paired with the remote control device **200** through Bluetooth low energy (BLE) communication, the display device **100** may obtain RSSI value on the strength of a signal received from the remote control device **200**. Accordingly, the display device **100** may transmit the obtained RSSI value to the mobile terminal **300**.

Also, the display device **100** may transmit a search function start notification to the remote control device **200** (S**705**). Accordingly, the remote control device **200** may perform an operation of emitting a predetermined signal and packet from the display device **100** in a situation where the user is not manipulating it.

Also, the display device **100** may transmit information about the set packet period to the remote control device **200**. Accordingly, the remote control device **200** may emit predetermined packet at set packet period.

Meanwhile, the remote control device **200** may broadcast a predetermined packet signal at a set packet period (S**706**).

For example, the remote control device **200** may transmit a predetermined packet signal to all nearby devices in a broadcast mode through Bluetooth low energy (BLE) communication without designating a specific device. In this case, the predetermined packet signal may include a non-connectable advertising packet as a broadcasting type signal.

Accordingly, the remote control device **200** may broadcast the predetermined packet signal to the display device **100** at set packet period (S**707**). Also, the remote control device **200** may broadcast the predetermined packet signal to the mobile terminal **300** at a set packet period (S**708**).

The mobile terminal **300** may receive the packet signal transmitted from the remote control device **200** through the communication unit **310** (S**708**).

Also, the processor **380** of the mobile terminal **300** may determine whether the device information matches based on the data packet signal received through the communication unit **310** (S**709**).

The processor **380** may determine whether the device information about the remote control device **200** received from the display device and the packet signal received from the remote control device **200** matches. For example, the processor **380** may determine whether the MAC address included in the packet signal received from the remote control device **200** matches the MAC address received from the display device **100**. Also, for example, the processor **380** may compare the device identification information included in the packet signal received from the remote control device **200** with the device identification information received from the display device **100** to determine whether they match.

Therefore, even if other devices other than the remote control device **200** broadcast data packet signal in broadcast mode through Bluetooth low energy (BLE) communication, the mobile terminal **300** may specify a packet signal broadcasted from the remote control device **200**. In addition, the mobile terminal **300** may identify a remote control device that is a target of a search command.

Also, the processor **380** of the mobile terminal **300** may acquire the signal strength of the received packet signal (S**710**).

For example, the processor **380** may obtain a received signal strength indicator (RSSI) for the received packet signal. Also, the processor **380** may obtain information about transmit power (TxPower) of the received packet signal. The processor **380** may obtain the signal strength of the received packet signal based on the received signal strength identifier (RSSI) and the transmit power (Tx Power).

Meanwhile, the received signal strength indicator (RSSI) is an index indicating the strength of a received signal. The higher the RSSI value, the stronger the signal strength. In addition, transmit power (TX Power) may be a value representing the power at which the remote control device **200** transmits a signal based on a predetermined distance (for example, 1 m).

Meanwhile, the processor **380** may measure the distance between the mobile terminal **300** and the remote control device **200** based on the signal strength of the received packet signal.

However, although the remote control device **200** broadcasts a packet signal at a preset packet cycle, noise may occur in the packet signal due to various reasons. When noise is generated in a packet signal, the signal strength may greatly exceed or fall below the average value of the strength of packet signal received for a predetermined time. Therefore, there is a need to deal with noise generation.

The processor **380** of the mobile terminal **300** may process a packet signal with noise based on whether the packet pattern changes.

For example, when a packet signal broadcast by the remote control device **200** is normally received by the display device **100** or the mobile terminal **300**, the packet signal is received at a preset packet period and a normal packet reception pattern may be generated. On the other hand, when some or all of the packet signals broadcast by the remote control device **200** are lost and received by the display device **100** or the mobile terminal **300**, an abnormality packet reception pattern may be generated if the packet signals are received differently from the preset packet period. A packet reception pattern may be created. Accordingly, a normal packet pattern may be change to the abnormal packet pattern or the abnormal packet pattern may be change to the normal packet pattern according to the network environment.

Meanwhile, whether or not the packet pattern changes may be determined by the display device **100** or the mobile terminal **300**.

The display device **100** may receive a packet signal broadcast from the remote control device **200**. The processor **170** of the display device **100** may determine a lost packet signal based on a preset packet period (S**711**). For example, if the preset packet period is 10 ms, the processor **170** may determine whether a packet is received in units of 10 ms, determine a normal packet reception pattern if the packet is received in 10 ms, and determine the abnormal packet reception pattern if packet loss occurs. The processor **170** may determine that the packet pattern is changed if the packet pattern is changed from the normal packet reception pattern to the abnormal packet reception pattern or from the abnormal packet reception pattern to the normal packet reception pattern (S**712**).

Also, the mobile terminal **300** may receive a packet signal broadcast from the remote control device **200**. The processor **380** of the mobile terminal **300** may determine a lost packet signal based on a preset packet period. For example, when the preset packet period is 10 ms, the processor **380** may determine whether a packet is received in units of 10 ms, determine the normal packet reception pattern if the packet is received in 10 ms, and determine the abnormal packet reception pattern if packet loss occurs. The processor **380** may determine that the packet pattern is changed if the packet pattern is changed from the normal packet reception pattern to the abnormal packet reception pattern or from the abnormal packet reception pattern to the normal packet reception pattern.

Meanwhile, when a packet pattern change occurs, the display device **100** may transmit a packet pattern change notification to the mobile terminal **300** (S**713**).

In addition, the display device **100** may transmit packet pattern information including information on whether the packet pattern is the normal packet reception pattern or the abnormal packet reception pattern to the mobile terminal **300**.

When a packet pattern change occurs, the processor **170** of the display device **100** may transmit packet pattern change information to the mobile terminal **300** using BLE communication through the communication unit **110**.

Meanwhile, the mobile terminal **300** may determine the distance to the remote control device **200** based on whether the packet pattern changes and the signal strength of the received packet signal (S**714**).

The mobile terminal **300** may use the abnormal packet signal strength that exceeds or falls short of a predetermined reference value based on the average packet signal strength for a predetermined time as information for determining the distance to the remote control device **200** or process the abnormal packet signal strength as packet signal strength with noise.

FIG. **8** is a diagram illustrating packet signal strength and packet pattern information for a packet signal broadcast at a predetermined packet period (10 ms) for a predetermined time (190 ms).

The processor **380** of the mobile terminal **300** may obtain an average packet signal strength (Avg) based on the packet signal strength of packet signal received for a predetermined time.

Based on the average packet signal strength (Avg), the processor **380** may determine an abnormal packet signal strength that exceeds or falls short of a predetermined reference value. The processor **380** may determine a first abnormal packet signal strength **801** and a second abnormal packet signal strength **802** as the abnormal packet signal strength.

Meanwhile, the processor **380** may determine whether a section in which the first abnormal packet signal strength **801** occurs corresponds to the packet loss occurrence section **803** based on the packet pattern information.

The processor **380** may determine the packet loss occurrence section **803** based on the packet pattern information received from the display device **100**.

The processor **380** may process the first abnormal packet signal strength **801** generated in the packet loss occurrence section **803** as information for determining a distance to the remote control device **200**. For example, when the packet loss occurs as the distance between the mobile terminal **300** and the remote control device **200** increases, the processor **380** may process the abnormal packet signal strength as information for determining the distance to determine the abnormal packet signal as the signal strength generated as the distance increases.

Meanwhile, the processor **380** may process the second abnormal packet signal strength **802** generated in the packet loss non-occurrence section **804** as the noise-generating packet signal strength. The processor **380** may process the abnormal packet signal strength as a noise signal that may occur in a network environment when packet is normally received at a predetermined period. Accordingly, the processor **380** may not use the second abnormal packet signal strength **802** when determining the distance to the remote control device **200**.

Meanwhile, the processor **380** of the mobile terminal **300** may determine that the distance to the remote control device **200** is getting closer when the signal strength of the packet signal received for a predetermined time increases.

In addition, the processor **380** of the mobile terminal **300** may determine that the distance from the remote control

device **200** is increased when the signal strength of the received packet signal is weakened for a predetermined time.

Meanwhile, the processor **380** of the mobile terminal **300** may determine whether or not a packet period reset is necessary (S**715**).

When the processor **380** may determine that a packet cycle reset is unnecessary if the processor **380** can determine whether the distance from the remote control device **200** increases or decreases within a predetermined time based on the packet signal strength.

When resetting the packet cycle is not required, the processor **380** may display information about the distance to the remote control device **200** through the display unit **351** of the output unit **350** or output sound notification through the audio output unit **352** (S**716**).

The processor **380** may display the signal strength of the received packet signal through the display unit **351** to provide an interface through which the user can determine the distance to the remote control device **200**. For example, the processor **380** may output the changed strength of the packet signal through the display unit **351** if the strength of the packet signal is changed more than a predetermined reference value and the distance can be determined. In addition, the processor **380** may output a sound notification through the audio output unit **352** when the intensity of the packet signal is changed more than a predetermined reference value and the distance can be determined. In this case, the sound notification may include sounds of different types or volumes depending on the distance from the remote control device **200**.

Therefore, the user can easily know information about whether the distance to the remote control device **200** is getting closer or farther by looking at the sound notification output from the audio output unit **352** or the packet signal strength output through the display, and can search the location of the remote control device **200** using the mobile terminal **300**.

Meanwhile, the processor **380** of the mobile terminal **300** reads information about the packet signal strength to determine the distance to the remote control device **200** when the variation range of the packet signal strength for a predetermined time is less than or equal to the preset variation range. In order to obtain more, it may be determined that a shorter packet period needs resetting.

In addition, the processor **380** may determine that a longer packet period reset with the remote control device **200** is required when a noise packet signal is generated more than a predetermined reference value for a predetermined time.

Meanwhile, the processor **330** may request a packet period reset from the display device **100** through the communication unit **110** (S**717**).

The display device **100** may reset the packet period in response to the received packet period reset (S**718**).

Also, the display device **100** may transmit information about the reset packet period to the remote control device **200** (S**719**). Accordingly, the remote control device **200** may emit a predetermined packet at set packet period.

Meanwhile, the remote control device search system of the present disclosure may be applied to a mobile device supporting a Bluetooth low energy (BLE) communication function. For example, the search system **10** may also be applied to search for a wireless earphone or wearable device supporting a BLE communication function. For example, when the display device **100** and a wearable device (not shown) are paired through BLE communication and the mobile terminal **300** and a wearable device (not shown) are paired through BLE communication, the user can search a location of the wearable device (not shown), by executing the search function provided by the search system **10** in the mobile terminal **300**.

FIG. **9** is a flowchart illustrating a method for searching for a remote control device according to an embodiment of the present disclosure.

The mobile terminal **300** may receive predetermined packet signals from external devices through BLE communication (S**901**).

The mobile terminal **300** may compare the device information included in each packet signal received from each external device with the device information of the remote control device **200** received from the display device **100**, and specify the remote control device **200** of the search target among the external devices (S**902**).

Meanwhile, the mobile terminal **300** may acquire the signal strength of the packet signal received from the remote control device **200** (S**903**).

In addition, the mobile terminal **300** may receive information about a packet period broadcast by the remote control device **200** from the display device **100** and determine a lost packet signal based on the received packet period (S**904**).

Meanwhile, the mobile terminal **300** may determine a packet pattern of a packet signal received from the remote control device **200** (S**905**).

The mobile terminal **300** can determine a normal packet reception pattern if the packet signal broadcast by the remote control device **200** is normally received by the mobile terminal **300** at a predetermined packet period. In addition, when some or all of the packet signals broadcast by the remote control device **200** are lost and received by the mobile terminal **300**, the mobile terminal **300** may determine the packet reception pattern as the abnormal packet reception pattern received differently from a preset packet period.

The mobile terminal **300** may determine the distance to the remote control device **200** based on the packet reception pattern and the packet signal strength (S**906**).

The mobile terminal **300** may determine whether or not the packet signal corresponds to an abnormal packet signal that exceeds or falls short of a predetermined reference value than the average packet signal strength, and whether or not to process the abnormal packet signal as a noise packet signal based on the packet reception pattern. The mobile terminal **300** may determine the distance to the remote control device based on the signal strength of a packet signal that does not correspond to a noise packet signal among packet signals received for a predetermined time.

In addition, the mobile terminal **300** may display information about the distance to the remote control device **200** through the display unit **351** of the output unit **350** or output a sound notification through the audio output unit **352** (S**907**).

The above description is merely an example of the technical idea of the present invention, and various modifications and variations can be made to those skilled in the art without departing from the essential characteristics of the present invention.

Therefore, the embodiments disclosed in the present invention are not intended to limit the technical idea of the present invention, but to explain, and the scope of the technical idea of the present invention is not limited by these embodiments.

Protection scope of the present invention should be construed according to the claims below, and all technical ideas

within the equivalent range should be construed as being included in the scope of the present invention.

The invention claimed is:

1. A mobile terminal, comprising:

a communication unit that is paired with a display device and configured to perform a communication;

an input unit configured to receive a search command from a user;

a processor configured to:

transmit a search function activation command to the display device through the communication unit,

receive a packet signal from a remote control device that transmits a packet signal at a predetermined packet period according to the search function activation command of the display device,

obtain a signal strength of the packet signal,

receive packet pattern information from the display device, and

determine a distance with the remote control device based on whether the packet is changed and the signal strength,

wherein the processor requests the display device to reset the predetermined packet period if it is impossible to determine whether the distance to the remote control device is getting closer or farther within a predetermined time, and

wherein the processor requests the display device to reset the packet period longer when a noise packet signal is generated more than a predetermined reference value for the predetermined time.

2. The mobile terminal of claim **1**, wherein the processor receives a first device identification information of the remote control device from the display device through the communication unit, and identifies a remote control device that is a target of a search command by determining whether the first device identification information of the remote control device matches a second device identification information included in the packet signal.

3. The mobile terminal of claim **1**, wherein the processor determines an abnormal packet signal that exceeds or falls short of a predetermined reference value among the obtained packet signal strengths based on an average packet signal strength.

4. The mobile terminal of claim **1**, wherein the processor determines a packet loss occurrence section based on the packet pattern information, and processes an abnormal packet signal strength in a packet loss non-occurrence section as a noise signal.

5. The mobile terminal of claim **3**, wherein the processor determines a packet loss occurrence section based on the packet pattern information, and determines the distance to the remote control device based on an abnormal packet signal strength in the packet loss occurrence section.

6. The mobile terminal of claim **1**, wherein the processor determines that the distance to the remote control device is getting closer if the signal strength of the packet signal received for a predetermined time increases.

7. The mobile terminal of claim **1**, wherein the processor determines that the distance from the remote control device is increased if the signal strength of the packet signal received for a predetermined time is weakened.

8. The mobile terminal of claim **1**, wherein the processor displays information about the distance to the remote control device through a display unit.

9. The mobile terminal of claim **1**, wherein the processor requests the display device to reset the packet period shorter if a change range of the packet signal strength for the predetermined time is less than or equal to a preset change range.

10. A display device paired with a mobile terminal and a remote control device, comprising:

a communication unit configured to receive a search function activation command from the mobile terminal;

a processor configured to:

in response to the search function activation command, transmit device information on the remote control device to the mobile terminal through the communication unit,

set a packet period so that the remote control device broadcasts a predetermined packet at a predetermined packet period,

transmit the set packet period with a search function start notification to the remote control device through the communication unit,

receive a request from the mobile terminal to reset the predetermined packet period if it is impossible to determine whether a distance to the remote control device is getting closer or farther within a predetermined time,

receive a request from the mobile terminal to reset the packet period longer when a noise packet signal is generated more than a predetermined reference value for the predetermined time, and

reset the packet period and transmit the reset packet period to the remote control device through the communication unit.

11. The display device of claim **10**, wherein the communication unit receives a packet signal broadcast at the set packet period from the remote control device and the processor determines a lost packet signal based on the set packet period.

12. The display device of claim **11**, wherein the processor determines whether a packet pattern is a normal packet reception pattern or an abnormal packet reception pattern based on the lost packet signal, and transmits packet pattern information to the mobile terminal through the communication unit.

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